

DOT/FAA/AR-95/36

Office of Aviation Research  
Washington, D.C. 20591

# **Computer Reservation System Coverage for U.S. Domestic Airlines: Implication for Passenger Profiling**

J. L. Fobes, Ph.D.

Aviation Security Human  
Factors Program, AAR-510  
FAA Technical Center  
Atlantic City International Airport, NJ 08405

September 1995

Final Report



This document is available to the public  
through the National Technical Information  
Service Springfield, Virginia 22161.



U.S. Department of Transportation  
**Federal Aviation Administration**

19951019 119

DTIC QUALITY INSPECTED 8

## NOTICE

This document is disseminated under the sponsorship of the United States Department of Transportation in the interest of information exchange. The United States Government assumes no liability for the content or use thereof. The United States Government does not endorse products or manufacturers. Trade or manufacturer's names appear herein solely because that are considered essential to the objective of this report.

## Technical Report Documentation Page

1. Report No.  DOT/FAA/AR-95/36	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Computer Reservation System Coverage for U.S. Domestic Airlines: Implications for Passenger Profiling		5. Report Date September 1995	
		6. Performing Organization Code AAR-510	
7. Author(s) J. L. Fobes, Ph.D. of the FAA, and J. P. Berkowitz, E. Neiderman, Ph.D., and R. L. Malone of Galaxy Scientific Corporation.		8. Performing Organization Report No.	
9. Performing Organization Name and Address  U.S. Department of Transportation Federal Aviation Administration FAA Technical Center Atlantic City International Airport, NJ 08405		10. Work Unit No. (TRIS)	
		11. Contract or Grant No. DTFA03-89-C-00043	
12. Sponsoring Agency Name and Address U.S. Department of Transportation Federal Aviation Administration FAA Headquarters 800 Independence Ave., S.W. Washington, DC 20071		13. Type of Report and Period Covered  Final	
		14. Sponsoring Agency Code ACS-1	
15. Supplementary Notes			
16. Abstract  This report details Computer Reservations System (CRS) coverage of U.S. domestic airlines. Specifically, this report assesses the number of U.S. Domestic airline passengers whose travel is not covered in a CRS. This number will be used to decide if a manual domestic passive profiling system, tailored for passengers not covered by a CRS, is required to augment an automated system that is currently being developed. This report concludes that the number of passengers not covered by a CRS is small, and that development of a manual instrument is not warranted. This report also provides recommendations for the direction of future aviation passenger profiling research.			
17. Key Words  human factors, computer reservation systems, aviation security, passenger profiling, terrorism		18. Distribution Statement  This document is available to the public through the National Technical Information Service Springfield, Virginia 22161.	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 25	22. Price

## PREFACE

This report details Computer Reservation System (CRS) coverage of U.S. domestic airlines. Specifically, the number of U.S. domestic airline passengers whose travel is not detailed in a CRS is provided. This number will be used to aid a decision as to whether an aviation security manual domestic passive profiling system tailored for passengers not covered by a CRS, is required to augment an automated CRS system currently being developed. The key FAA person supporting this testing effort is J. L. Fobes, Ph.D., Aviation Security Human Factors Program Manager and Engineering Research Psychologist for the Aviation Security Research and Development Division (AAR).

Galaxy Scientific Corporation prepared this document under contract number DTFA03-89-C-00043 with the FAA Technical Center. The Program Manager at Galaxy Scientific Corporation is William Hassler, Jr. The authors of this document are Jack Berkowitz, Eric Neiderman, Ph.D., and Robert Malone.

Accession For	
NTIS	CRA&I <input checked="" type="checkbox"/>
DTIC	TAB <input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution /	
Availability Codes	
Dist	Avail and/or Special
A-1	



## TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
EXECUTIVE SUMMARY	v
1. INTRODUCTION	1
1.1 Background	1
1.1.1 Passive Profiling	1
1.1.2 Passive Profiling Study	2
1.2 Scope	2
2. METHOD	3
3. ANALYSIS	4
3.1 Airline Industry Trends	4
4. RECOMMENDATION	5
5. REFERENCES	5
APPENDIX A - Supporting Data for Computer Reservation System (CRS) Coverage Calculations	

## LIST OF ACRONYMS

ATA	Air Transport Association of America
AvSec HF	Aviation Security Human Factors Program
CT	Computerized Tomography
CRS	Computer Reservation System
DOT	Department of Transportation
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
GAO	U.S. General Accounting Office
OT&E	Operational Test and Evaluation
RAA	Regional Airline Association

## 1. INTRODUCTION.

### 1.1 BACKGROUND.

In an effort to improve the overall security system at U.S. airports, various new technologies are being developed and tested. New hardware technologies include X-ray scanners, Computerized Tomography (CT) scanners, screener training devices, and access control systems. In addition to these hardware technologies, new means of interviewing or profiling passengers before they board the aircraft are being developed and evaluated.

Passenger profiling techniques, which involve security personnel or ticket agents actively probing a passenger for information, have been used internationally for many years. In contrast, in the domestic market passenger profiling is not currently used. The time required to actively profile and interview passengers is not feasible in the United States because of the throughput requirements for the 500 million passenger annual load.

As the potential for domestic threats continues to increase, the potential security benefits of using passenger profiling become more attractive. Thus, the Federal Aviation Administration (FAA) Office of Aviation Security Intelligence as well as the Aviation Security Research and Development Division have been investigating the development of passive profiling techniques that may be feasible for the U.S. annual passenger load.

#### 1.1.1 Passive Profiling.

Passive profiling techniques do not employ active passenger probing, interviewing, or querying. Passive passenger profiling techniques involve collection of passenger data that is available from documentation and other sources to support a decision about the threat potential of a particular passenger. The passive profiling technique recently developed by the Aviation Security Human Factors (AvSec HF) Program is based on the tenet that sufficient information can be gathered to determine when a passenger is probably not a threat to an aircraft. Once this determination is made, the passenger can be relieved from any special security precautions. Passengers not cleared by the profiling instrument are not considered to be de facto threats, but instead are considered to be those for whom there is not sufficient information to make a reasonable threat decision. These passengers require additional special scrutiny since they have not been eliminated as a threat. In these cases, precautions such as active interviewing, positive passenger bag match, or more stringent passenger and/or baggage search may be conducted.

The critical element of passive profiling is the minimal interaction between the ticket agent or security person and the passenger. A primary feature of this technique is the speed of transaction



for processing a passenger. The airline industry has clearly indicated that substantial delays in passenger handling time would severely limit their ability to continue service, particularly in a high-threat condition. Thus, passive profiling, with its rapid processing time, has a great advantage over active profiling in that it increases aviation security while minimally impacting passenger handling time.

#### 1.1.2 Passive Profiling Study.

In February 1994, an initial feasibility study of a passenger profiling system was conducted using domestic passengers (Fobes & Lofaro, 1994). The research paradigm that was used included: 1) convening a subject-matter expert panel to assess data elements and weights for passenger profiling; 2) development of a manual profiling mechanism; 3) field test of the manual profiling mechanism; and 4) estimation of the resources to field the system and its cost-effectiveness.

The results of the study indicated that it was possible to develop a passive profiling system; however, resource and time requirements made such a manual system unfeasible for lengthy and/or broad-based implementation. The study also noted that the majority of data elements required to reach the profiling decision were available in the passenger Computer Reservation System (CRS) record and in other airline computerized data bases.

These results spawned two follow-on efforts. The first was to develop a computerized passive profiling system using a domestic airline's CRS. Northwest Airlines was awarded a grant (Dombrowski & Klinkenberg, 1995) for this process and it is currently undergoing operational test and evaluation (OT&E) using the WorldSpan CRS. After the system is successfully developed for this particular CRS, it will be modified to run on the other CRSs used by major carriers.

The second effort is the potential development of a manual system for airlines that do not have access to a CRS. This manual system could also be used as a backup if the CRS was not functioning properly. The initial step in this effort is to determine the number of passengers not affected by a CRS.

If U.S. airline figures indicate a substantial lack of CRS coverage, then it might be necessary to pursue a manual passenger profiling system for passengers not covered by CRS.

#### 1.2 SCOPE.

This report presents preliminary CRS coverage data. The purpose of this report is to detail the number of domestic passengers who would not be covered if a computerized passive profiling system based on airline CRS data were implemented.

The initial task was to investigate the ten largest domestic carriers and determine their CRS coverage. As this task was conducted, it became apparent that much broader and deeper analysis would be necessary to adequately capture the state of the industry. Thus, this report presents a snapshot of the industry. These data must therefore be considered to be preliminary; however, they are probably as accurate as any snapshot, given the dynamic nature of the airline industry.

## 2. METHOD.

The data were collected from various sources. Initial data were gathered from the Air Transport Association of America (ATA) and the Regional Airline Association (RAA). These two associations provided preliminary data; however, they do not maintain active listings of CRSs used by each airline. The ATA and RAA suggested directly contacting the air carriers and CRS providers.

An introductory letter was sent to all ATA and RAA member airlines requesting information about the CRSs used. The letter also requested information about code-sharing (i.e., CRS sharing) arrangements by the airlines. A code-sharing arrangement provides for cross-listing of flights between airlines, and, in the current market, code sharing arrangements exist between national carriers and small commuter carriers. These code sharing arrangements involve direct computer data access and coordination between the large national carrier's CRS and its code sharing partner. The response to the air carrier letters was moderate, and subsequent discussions and follow-up calls to several of the airlines increased the response rate. This follow up yielded a more confident estimate of the number of passengers not covered by a CRS.

Attempts to directly contact the CRS community were largely unsuccessful. Essentially, the use of CRS and customer relationships are considered proprietary information in a highly competitive market. The CRSs that were contacted declined to furnish information.

However, it is possible to estimate the required data from publicly available sources and summary data provided below are based on figures for 1993 and 1994 air travel in the United States. The sources for these data are the ATA and RAA 1994 annual reports, which present 1993 data. These data have been augmented with 1994 data provided by ATA for 80 scheduled air carriers.

Given the highly competitive nature of the deregulated airline industry, it is exceedingly difficult to collect precise data on airline code-sharing alliances. For example, the U.S. General Accounting Office (GAO), in a May 1995 report on code-sharing alliances, conceded that they were not thoroughly successful in gathering data on international-domestic code-sharing agreements. The GAO stated that they were able to collect information on 85 percent of the 61 code-sharing alliance approved by the Department of Transportation (DOT) since 1987.

In addition to the reluctance of the industry to disseminate precise data, there are discrepancies in the format and presentation of available data. One such discrepancy is the ratio of domestic to international passengers on each carrier. Reliable data for 1994 are available for each category for the industry as a whole. Specific figures are only presented for all airline operations (domestic and international inclusive) and are thus not separable into component categories. In the calculations presented in this report, domestic enplanements were used for the overall industry.

### 3. ANALYSIS.

The analysis was based on the 1993 and 1994 passenger enplanement data and code-sharing relationships. The supporting data for the calculations are provided in Appendix A.

Airline CRS usage was derived from various published airline sources, questionnaires sent to individual airlines, and conversations with airline representatives. The precise CRS used by an airline could be incorrect due to either faulty initial information or changes in the airline's internal systems. These data should be confirmed with the airlines if there is continued passenger profiling development.

For all (ATA and RAA) carriers in 1994, out of approximately 544,993,971 passengers, approximately 2,287,163 (0.42 percent) were not covered by a CRS.

The number of non-covered passengers is derived solely from regional and commuter airline traffic data, because only regional and commuter airlines reported passengers uncovered by a CRS. This number is an estimate derived by combining 1993 and 1994 data. Since the 1994 regional carrier data have yet to be released, it was assumed that the number of passengers from 1993 remains constant across the two years.

For regional airline carriers in 1993, there were 52,675,971 passengers. For regional carriers, the 2,287,163 domestic airline passengers not covered by a CRS represents 4.2 percent of their total passengers enplaned.

#### 3.1 AIRLINE INDUSTRY TRENDS.

A recent trend in the airline industry is that a growing portion of the domestic does not use standard tickets. For instance, Atlanta-based ValuJet, with 2.1 million passengers in 1994 and 4 million passengers estimated for 1995, does not issue passenger tickets. Ticketless travel has also been used in California by United and Southwest Airlines; however, these airlines are using their standard CRSs for ticketless flights. The increasing trend toward ticketless travel also complicates manual passive profiling because the alternative to profiling with CRS information is profiling with information on the ticket lift.

Another trend that is impacting CRS coverage is the increasing sophistication and complexity of code-sharing agreements. The research conducted for this report identified code sharing relationships incorporating multiple airlines. This trend toward more sophisticated code-sharing is also evident in agreements that several regional carriers have with multiple major carriers. These agreements have spawned development of multiple computer systems and hybrid reservation systems. The hybrid systems often use CRS translators. For example, some commuter airlines use the SABRE system for reservations while using a translator to import and export APOLLO formatted data.

#### 4. RECOMMENDATION.

The data indicate a relatively small number of passengers not covered by a CRS relative to the total number of passengers carried. Additionally, the majority of passengers not covered by a CRS were carried by a Federal Aviation Regulation (FAR) Part 135 carrier. These carriers are considered to be low-risk and they are not subjected to the same levels of regulation by the FAA. Given these findings, the recommendation is to not develop a system for passively profiling passengers not covered by a CRS.

#### 5. REFERENCES.

1. Dombrowski, J. & Klinkenberg, J. Computer assisted passenger screening (CAPS)\FAA Grant 94-G-031 to Northwest Airlines, 1995.
2. Fobes, J. L. & Lofaro, R. Test and evaluation report for the manual domestic passive profiling system (MDPPS) [F.O.U.O.], DOT/FAA/CT-94/86, 1994.

## APPENDIX A - SUPPORTING DATA FOR COMPUTER RESERVATION SYSTEM (CRS) COVERAGE CALCULATIONS

Please note that these data are considered preliminary. Airline CRS usage was derived from various published airline sources, questionnaires sent to individual airlines, and conversations with airline representatives. These data are considered accurate; however, the precise CRS used by an airline could be incorrect due to either faulty initial information or changes in the airline's internal systems. These data should be confirmed with the airlines if there is continued passenger profiling development.

TABLE A-1. PASSENGERS CARRIED BY AIRLINE TRANSPORT ASSOCIATION (ATA)  
MEMBER CARRIERS

ATA Member Carriers	1994 Passengers	1993 Passengers	
Alaska Airlines	8,885,000	6,351,000	
Aloha	5,032,000	4,704,000	
America West	15,629,000	0	not reported
American	81,082,000	82,536,000	
American Trans Air	1,686,000	1,199,000	
Continental	39,947,000	37,280,000	
Delta	88,922,000	84,813,000	
DHL	0	0	cargo carrier
Evergreen	0	0	cargo carrier
FedEx	0	0	cargo carrier
Hawaiian	4,576,000	4,327,000	
Kiwi	1,115,000	0	not reported
Midwest Express	1,168,000	0	not reported
Northwest	45,496,000	44,098,000	
RAA	38,000	51,000	
Southwest	44,238,000	37,517,000	
TWA	20,880,000	18,938,000	
United	74,070,000	69,672,000	
UPS	0	0	cargo carrier
USAir	59,494,000	53,679,000	
Total ATA Passengers (all flights)	492,258,000	445,165,000	

*Source: ATA 1995 Annual Report Figures, available at ATA Internet site.*

TABLE A-2. TOTAL PASSENGERS FROM 80 U.S. SCHEDULED AIRLINES  
(includes ATA and some RAA members, as well as some additional carriers)

U.S. Scheduled Airlines (subset of 80 airlines)	Domestic	International	Total
1992	431,693,000	43,415,000	475,108,000
1993	443,172,000	45,348,000	488,520,000
1994	481,302,000	47,074,000	528,376,000

Source: ATA 1995 Annual Report Figures, available at ATA Internet site.

TABLE A-3. TOTAL DOMESTIC PASSENGERS CARRIED BY U.S. AIRLINES

	1994	1993	
ATA Passengers	492,258,000	445,165,000	
RAA Passengers	52,675,971	52,675,971	(1993 Figure used for both)
Total Passengers	544,933,971	497,840,971	Figures are greater than above as they account for more airlines. The Actual Number is probably larger as there are some airlines included in the ATA U.S. SCHEDULED AIRLINES figure which are not members of either ATA or RAA, therefore no precise figures exist.

Source: ATA 1995 Annual Report Figures, available at ATA Internet site, 1994 RAA Annual Report, and figures derived from other sources

TABLE A-4. TOTAL REGIONAL AIRLINE ASSOCIATION (RAA) MEMBER PASSENGERS CARRIED (1993)

	1993 Passengers
Total Industry Enplanements	52,675,971
Total Enplanements - Top 50 Regional Airlines	51,389,471
Passengers not in top 50	1,286,500

Source: 1994 RAA Annual Report.

TABLE A-5. TOP 50 REGIONAL AIRLINE ASSOCIATION (RAA) CARRIERS  
PASSENGERS NOT COVERED BY COMPUTER RESERVATION SYSTEM (CRS) (1993)

Airline	Rank	1993 Passengers
Conquest Airlines	39	125,869
Nantucket Airlines	40	124,924
Vieques Air Link	42	116,245
Grand Airways	43	110,852
Empire Airways	44	98,603
Lone Star Airlines	47	90,547
Cape Air	48	89,708
Air Nevada Airlines	49	86,770
<i>Total Passengers</i>		<i>843,518</i>
Lake Powell Air Service	38	134,257
Chicago Express Airlines	71	22,888
	<i>Subtotal</i>	<i>157,145</i>
Worst-Case total		1,000,663

*Source: 1994 RAA Annual Report, other sources, and calculations*

TABLE A-6. ALL REGIONAL AIRLINE ASSOCIATION (RAA) CARRIERS PASSENGERS  
NOT COVERED BY COMPUTER RESERVATION SYSTEM (CRS) (1993)

	Estimate	Worst-case
Total Passengers Covered by Code Share	50,545,953	50,388,808
Total Passengers Not Covered by Code Share	2,130,018	2,287,163
Percent of RAA Total (1993)	0.040436236	0.043419475

*Source: 1994 RAA Annual Report, other sources, and calculations*



TABLE A-7. CALCULATIONS OF PASSENGERS NOT COVERED

	1994	1993	
Total Passengers	544,933,971	497,840,971	
Passengers Not Covered by CRS or Code-share	2,130,018	2,130,018	(1993 Figures)
Proportion of Passengers Not Covered	0.003908763	0.004278511	
Worst-case Passengers Not Covered	2,287,163	2,287,163	(1993 Figures)
Proportion Worst-case	0.004197138	0.004594164	

*Source: ATA 1995 Annual Report Figures, available at ATA Internet site, 1994 RAA Annual Report, and figures derived from other sources*

TABLE A-8. CODE SHARING RELATIONSHIPS AND COMPUTER RESERVATION SYSTEM (CRS) COVERAGE IN U.S. AIRLINES

Airline	dba	Member	Parent or Code-Share	CRS
Aerial				
Air L.A.		RAA		
Air Midwest	USAir Express		USAir	APOLLO
Air Nevada		RAA		
Air Transport International				
Air Wisconsin		RAA	United	APOLLO
Airmark				
AirVantage		RAA		
Airways International		RAA		
Alaska		ATA		WorldSpan
Allegheny Commuter	USAir Express	RAA	USAir	APOLLO
Aloha		ATA		SABRE
Aloha IslandAir	Islandair	RAA	Aloha	SABRE
Alpha Aviation	Trans World Express	RAA	Trans World Airlines	WorldSpan
Alpine Aviation	Alpine Air	RAA		
America West		ATA	Continental	SHARES

TABLE A-8. CODE SHARING RELATIONSHIPS AND COMPUTER RESERVATION SYSTEM (CRS) COVERAGE IN U.S. AIRLINES (Continued)

Airline	dba	Member	Parent or Code-Share	CRS
American		ATA		SABRE
AmeriFlight		RAA		
American International				
American Trans Air		ATA		WorldSpan
Amerijet				
Arctic Circle Air Service		RAA		
Arizona Airways		RAA		
Arizona Pacific Airlines		RAA		
Arrow				
Astral Aviation	Midwest Express Connection	RAA	Midwest Express	SABRE
	Skyway Airlines	RAA	Midwest Express	SABRE
Atlantic Coast	United Express	RAA	United	APOLLO
Atlantic Southeast	Delta Connection	RAA	Delta	WorldSpan
Atlas Air				
AV Atlantic				
Aviation Associates	Sunair Express	RAA		
Baker Aviation		RAA		
Bankair, Inc		RAA		
Baron Aviation Services		RAA		
Basler Flight Service		RAA		
Bellaire		RAA		
Bemidji Aviation		RAA		
Bering Air	Alaska Airlines Commuter	RAA	Alaska	WorldSpan
Big Sky Transportation	Big Sky Airlines	RAA		
Bighorn Airways		RAA		
Blackhawk Airways		RAA		
Borinquen Air	Air Puerto Rico	RAA		
Branson Express	Branson Airlines	RAA		
BUSiness Air		RAA		
Braniff International				

TABLE A-8. CODE SHARING RELATIONSHIPS AND COMPUTER RESERVATION SYSTEM (CRS) COVERAGE IN U.S. AIRLINES (Continued)

Airline	dba	Member	Parent or Code-Share	CRS
Buffalo				
BUSiness Express	Delta Connection	RAA	Delta	WorldSpan
			Northwest	WorldSpan
Camai Air		RAA		
Cape Air		RAA		
Cape Smythe Air Service		RAA		
Capitol Air		RAA		
Caribbean International	CaribAir	RAA		
Carnival				
Casino Express				
CCAir	USAir Express	RAA	USAir	APOLLO
Cental Airlines		RAA		
Chalk's International Airlines		RAA		
Challenge Air Cargo				
Chautauqua	USAir Express	RAA	USAir	APOLLO
Cherokee Express		RAA		
Chicago Express Airlines		RAA	Phoenix Airline Service	WorldSpan
CirrUS Air		RAA		
Coastal Air Transport		RAA		
Colgan Air		RAA		
Comair	Delta Connection	RAA	Delta	WorldSpan
Commutair	USAir Express	RAA	USAir	APOLLO
Conquest Airlines		RAA		
Continental		ATA		SHARES
Continental Express	Continental Express	RAA	Continental	SHARES
Continental Micronesia			Continental	SHARES
Corporate Air		RAA		
Crown Airways			USAir	APOLLO
Delta		ATA		WorldSpan
DHL Airways		ATA		
Direct Air	Midway Connection	RAA		

TABLE A-8. CODE SHARING RELATIONSHIPS AND COMPUTER RESERVATION SYSTEM (CRS) COVERAGE IN U.S. AIRLINES (Continued)

Airline	dba	Member	Parent or Code-Share	CRS
Eagle Airlines				
Emery				
Empire		RAA		
ERA Aviation	Alaska Airlines Commuter	RAA	Alaska	WorldSpan
Evergreen International		ATA		
Executive Airlines		RAA		
Executive Airlines, Inc.	American Eagle	RAA	American	SABRE
Express Airlines 1	Northwest Airlink	RAA	Northwest	WorldSpan
Express Airlines 2	Northwest Airlink	RAA	Northwest	WorldSpan
Express One				
FedEx		ATA		
Fine Airlines				
Flagship Airlines	American Eagle	RAA	American	SABRE
Flamenco Airlines		RAA		
Flight Express		RAA		
FloridaGulf	Mesa Airlines	RAA	USAir	APOLLO
	USAir Express	RAA	USAir	APOLLO
Florida West				
Four Star Aviation		RAA		
Frontier Flying Service		RAA		
F.S. Air Service		RAA		
GP-Express Airlines	Continental Connection	RAA	Continental	SHARES
Grand Airways		RAA		
Grand Canyon Airlines		RAA		
Grant Aviation		RAA		
Great American		RAA		
Great Lakes Aviation	United Express	RAA	United	APOLLO
Gulfstream International	United Express	RAA	United	APOLLO

TABLE A-8. CODE SHARING RELATIONSHIPS AND COMPUTER RESERVATION SYSTEM (CRS) COVERAGE IN U.S. AIRLINES (Continued)

Airline	dba	Member	Parent or Code-Share	CRS
Hageland Aviation Services		RAA		
Haines Airways		RAA		
Harbor Airlines		RAA		
Hawaiian		ATA		SABRE
Hoganair		RAA		
Horizon Air	Alaska Airlines Commuter	RAA	Alaska	WorldSpan
	Northwest Airlin		Northwest	WorldSpan
Iliamna Air Taxi		RAA		
International Cargo Express				
Island Airlines		RAA		
Island Express		RAA		
Jet Fleet				
Jet Freighters		RAA		
Jetstream International	USAir Express	RAA	USAir	APOLLO
Kenmore Air Harbor		RAA		
Ketchikan Air Service		RAA		
Kitty Hawk Air Cargo		RAA		
Key				
Kiwi		ATA		
LAB Flying Service	Alaska Airlines Commuter	RAA	Alaska	WorldSpan
Lake Powell Air Service			Skywest	WorldSpan
Larry's Flying Service		RAA		
Las Vegas Airlines		RAA		
Liberty Express Airlines	Mesa Airlines	RAA	USAir	APOLLO
	USAir Express	RAA	USAir	APOLLO
Loken Aviation		RAA		
Lone Star Airlines		RAA		

TABLE A-8. CODE SHARING RELATIONSHIPS AND COMPUTER RESERVATION SYSTEM (CRS) COVERAGE IN U.S. AIRLINES (Continued)

Airline	dba	Member	Parent or Code-Share	CRS
Mohalo Air		RAA		
Majestic Airlines		RAA		
Markair	MarkAir	RAA		SABRE
	MarkAir Express	RAA	MarkAir	SABRE
Martinaire		RAA		
Merlin Express	Texas National Airlines	RAA		
Mesa	American West Express	RAA	American West	SHARES
	United Express	RAA	United	APOLLO
	USAir Express	RAA	USAir	APOLLO
Mesaba	Northwest Airlink	RAA	Northwest	WorldSpan
Methow Aviation		RAA		
Metro Airlines		RAA		
MGM Grand				
Miami Air				
Mid Pacific Air Corp		RAA		
Mid-Atlantic Freight		RAA		
Midwest Express		ATA		SABRE
Millon				
Morris				
Mountain Air Cargo		RAA		
Murray Aviation		RAA		
Nantucket Airlines		RAA		
NationalAir		RAA		
New England Airlines		RAA		
New York Helicopter Corp		RAA		
North American				
Northeast Express Regional	Northeast Express	RAA		WorldSpan
	Norhtwest Airlink	RAA		WorldSpan
Northern Air				
Northwest		ATA		WorldSpan
Olson Air Service		RAA		*

TABLE A-8. CODE SHARING RELATIONSHIPS AND COMPUTER RESERVATION SYSTEM (CRS) COVERAGE IN U.S. AIRLINES (Continued)

Airline	dba	Member	Parent or Code-Share	CRS
Pacific Air of Oregon	Pacific Air	RAA		
Papillion Grand Canyon		RAA		
Paradise Island Airlines		RAA		SHARES
Patriot				
Peninsula Airlines	Alaska Airlines Commuter	RAA	Alaska	WorldSpan
Piedmont	USAir Express	RAA	USAir	APOLLO
Planemaster Services		RAA		
Polynesian Airways		RAA		
Precision Valley Aviation	Northwest Airlink	RAA	Northwest	WorldSpan
Private Jet				
Promech Air		RAA		
Prompt Air		RAA		
Ram Air Freight		RAA		
Ramp 66		RAA		
Redwing Airways		RAA		
Reeve Aleutian Airways (RAA)		ATA		
Regional Express		RAA		
Reno		ATA		3rd Party
Renown Aviation		RAA		
Rhodes Aviation		RAA		
Rich				
Rolling Hills Aviation	Skynet Airways	RAA		
Ross Aviation		RAA		
Ryan International		RAA		
Sabre Cargo Airlines		RAA		
Salair Air Cargo		RAA		
Scenic Airlines	SkyWest Airlines	RAA	Delta	WorldSpan
	Delta Connection	RAA	Delta	WorldSpan
Sierra Pacific		RAA		

TABLE A-8. CODE SHARING RELATIONSHIPS AND COMPUTER RESERVATION SYSTEM (CRS) COVERAGE IN U.S. AIRLINES (Continued)

Airline	dba	Member	Parent or Code-Share	CRS
Simmons	American Eagle	RAA	American	SABRE
Skagway Air Service		RAA		
SkyWest	Delta Connection	RAA	Delta	WorldSpan
Skyway Airlines	Midwest Express	RAA	Midwest Express	SABRE
	(same as Astral Aviation)			
Smithair		RAA		
SouthCentral Air		RAA		
Southeast Aviation	Southeast Airlines	RAA		
Southern Air				
Southwest		ATA		SABRE
Spirit Air				
Sports Air Travel		RAA		
Springdale Air Service		RAA		
Stateswest Airlines			USAir	APOLLO
Suburban Air Freight		RAA		
Sunair Express	United Express	RAA	United	SABRE
Sun Country				
Superior Airlines	Mesa Airlines	RAA	America West	SHARES
	America West Express			
Superior Aviation		RAA		
Tanana Air Service		RAA		
Taquan Air Service		RAA		
Tar Heel Aviation		RAA		
Tatonduk Outfitters		RAA		
Telford Aviation		RAA		
Tolair Services	Tolair	RAA		
Tower				SABRE
Trans Executive	Trans Air Link	RAA		
Trans American Charter				
Trans Continental				
Trans Northe Airlines		RAA		



TABLE A-8. CODE SHARING RELATIONSHIPS AND COMPUTER RESERVATION SYSTEM (CRS) COVERAGE IN U.S. AIRLINES (Continued)

Airline	dba	Member	Parent or Code-Share	CRS
Trans States	Alaska Airlines Commuter	RAA	Alaska	WorldSpan
	Northwest Airlink	RAA	Northwest	WorldSpan
	Trans World Express	RAA	Trans World	WorldSpan
	USAir Express	RAA	USAir	APOLLO
TWA		ATA		WorldSpan
Trans World Express	Trans World Express	RAA	Trans World Airlines	WorldSpan
UFS, Inc	United Express	RAA	United	APOLLO
Ultrair				
Union Flights		RAA		
United		ATA		APOLLO
United Feeder Service	United Express	RAA	Trans States Airlines	APOLLO
UPS		ATA		
USAir		ATA		APOLLO
USAir Shuttle				APOLLO
U.S. Check Airlines		RAA		
ValuJet				3rd Party
Vieques Air Link		RAA		
Vista Airways		RAA		
Walker's Aviation Services		RAA		
Warbelow's Air Service		RAA		
West Isle Air		RAA		
WestAir	United Express	RAA	United	APOLLO
	Mesa Airlines	RAA		
West Air		RAA		
Wiggins Airways		RAA		
Wilbur's				
Wings Airways		RAA		
Wings of Alaska		RAA		
Wing's West	American Eagle	RAA	American	SABRE
World				
Worldwide				
WRA		RAA		
Wrangler				

TABLE A-8. CODE SHARING RELATIONSHIPS AND COMPUTER RESERVATION  
SYSTEM (CRS) COVERAGE IN U.S. AIRLINES (Continued)

Airline	dba	Member	Parent or Code-Share	CRS
Wright Air Service		RAA		
Yutana Airlines		RAA		
Yute Air Alaska		RAA		
Zantop				
40-Mile Air		RAA		